BlueBoard-LPC11U24/37

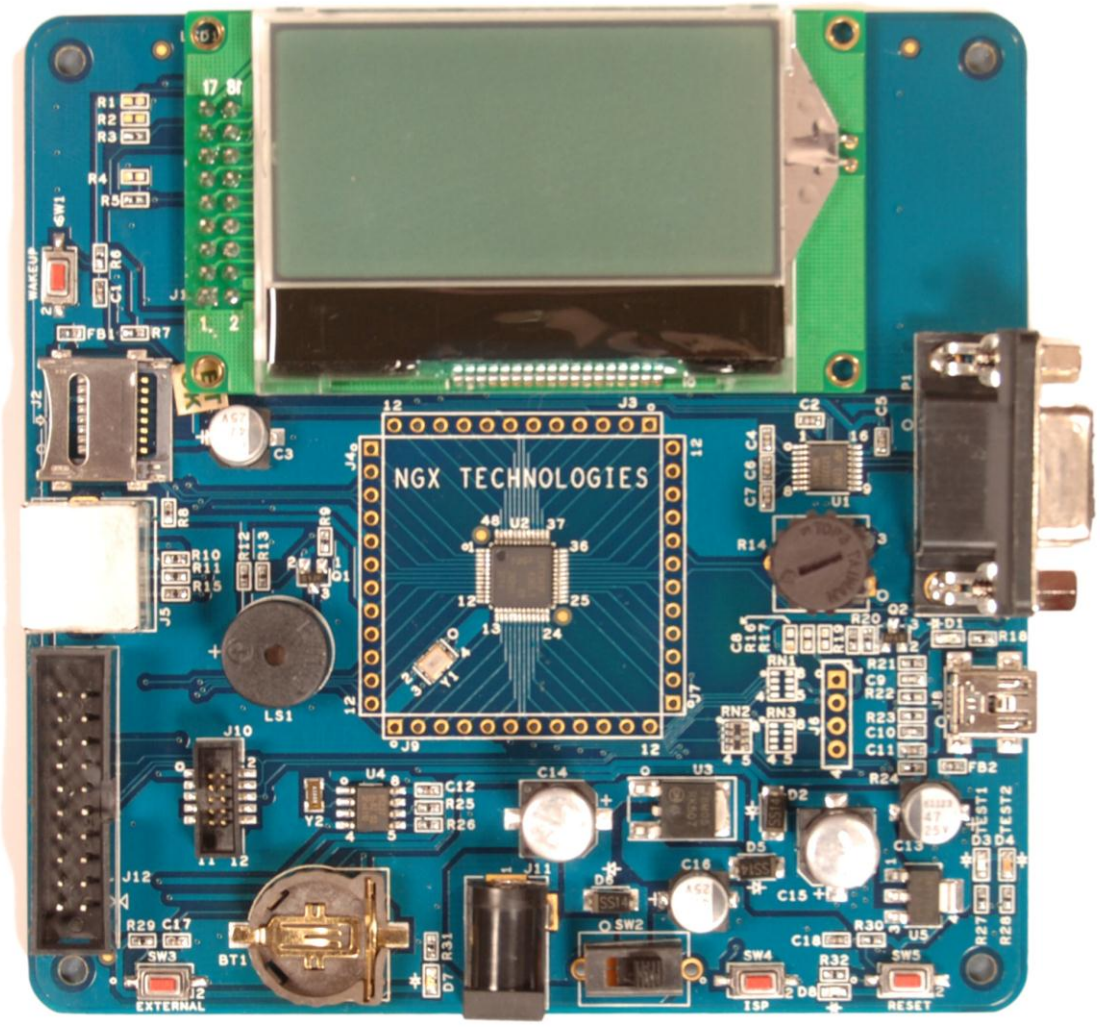

Fig. 1

About NGX Technologies

NGX Technologies is a premier supplier of development tools for the ARM7, ARM Cortex M0, M3 and M4 series of microcontrollers. NGX provides innovative and cost effective design solutions for embedded systems. We specialize in ARM MCU portfolio, which includes ARM7, Cortex-M3, M0 & M4 microcontrollers. Our experience with developing evaluation platforms for NXP controller enables us to provide solutions with shortened development time thereby ensuring reduced time to market and lower development costs for our customers. Our cost effective and feature rich development tool offering, serves as a testimony for our expertise, cost effectiveness and quality.

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Vijayanagar 2nd Stage,
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CE certification

NGX Technologies BLUEBOARD-LPC11U24/37 board have been tested for radiated emission as per EN55022 class A standard. The device is under the limits of the standard EN55022 class A and hence CE marked. No other test have been conducted other than the radiated emission (EN55022 class A standard). The device was tested with the ports like USB, Serial, and Power excluding the GPIO ports. Any external connection made to the GPIO ports may alter the EMC behaviour. Usage of this device under domestic environment may cause unwanted interference with other electronic equipment's. User is expected to take adequate measures. The device is not intended to be used in and end product or any subsystem unless the user re-evaluates applicable directive/conformance.

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1.0 INTRODUCTION

This document is the User Manual for the BLUEBOARD-LPC11U24/37, a low cost ARM Cortex-M0 based board by NGX Technologies. This document reflects its contents which include system setup, debugging, and software components. This document provides detailed information on the overall design and usage of the board from a systems perspective.

Before proceeding further please refer the quick start guide for BLUEBOARD-LPC11U24/37 features and BLUEBOARD-LPC11U24/37 verification.

For BLUEBOARD-LPC11U24/37 Quick Start Guide: Click here.

For the most updated information on the BLUEBOARD-LPC11U24 board please refer to NGX'website.

For the most updated information on the BLUEBOARD-LPC11U37 board please refer to NGX'website.

2.0 BLUEBOARD-LPC11U24/37 Development Tool Setup

2.1 IDE and debugger

As mentioned in the earlier section, NGX's MCU evaluation platforms are not coupled tightly with any one particular combination of IDE and debugger. The following sections will explain the setup for LPCXpresso and NXP LPC-Link as the IDE and debugger respectively.

2.2 Installation & Configuration of LPCXpresso software

For installation and configuration of LPCXpresso Click here.

*Note: We have used **LPCXpresso version 4.2.2_275** while creating the User manual for this evaluation kit. Please ensure that you are using **LPCXpresso version 4.2.2_275 or** above.*

2.3 Setup for NXP LPC-Link and BLUEBOARD-LPC11U24/37 Board

The BLUEBOARD-LPC11U24/37 board has on board 10 pin SWD/JTAG box, the 10 pin cable is not a part of the BLUEBOARD-LPC11U24/37 package, the user needs to buy 10 pin cable separately.

To run the BLUEBOARD-LPC11U24/37 examples you need the following components and the image shows the each components:

- NXP LPC-Link
- 10 pin cable
- BLUEBOARD-LPC11U24/37 Board
- One USB AM to Mini B cable

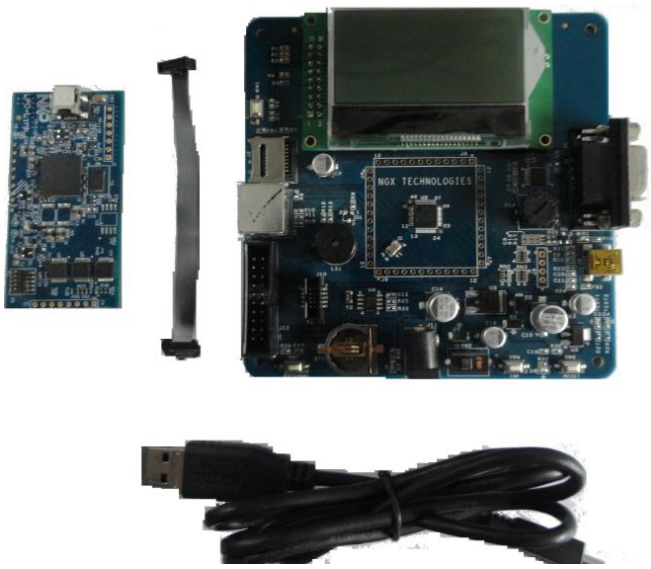

Fig.2

Separate the LPCXpresso controller part and use only the NXP LPC-Link. Connections of components are as shows in the following image.

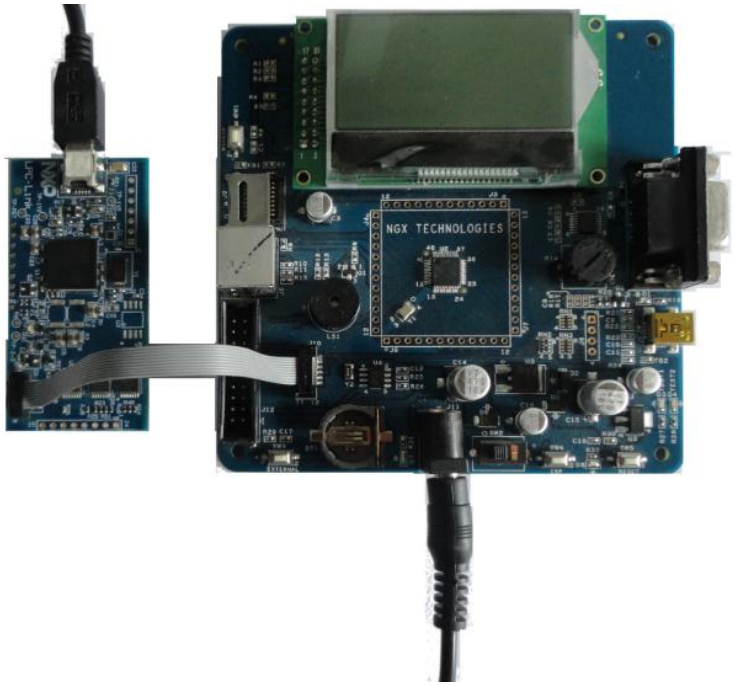

Fig.3

The above setup is ready to use for development in **LPCXpresso IDE**.

3.0 BLUEBOARD-LPC11U24/37 firmware Development

3.1 Executing the sample projects in LPCXpresso

Please note that the sample programs are available to download once the product is registered.

Steps to execute the sample project:

Step 1: Open LPCXpresso; Browse the folder which contains **BB-LPC11U24_Xpresso_Sample_programs.zip** (For BlueBoard-LPC11U37: **BB-LPC11U37_Xpresso_Sample_programs.zip**) project and click OK.

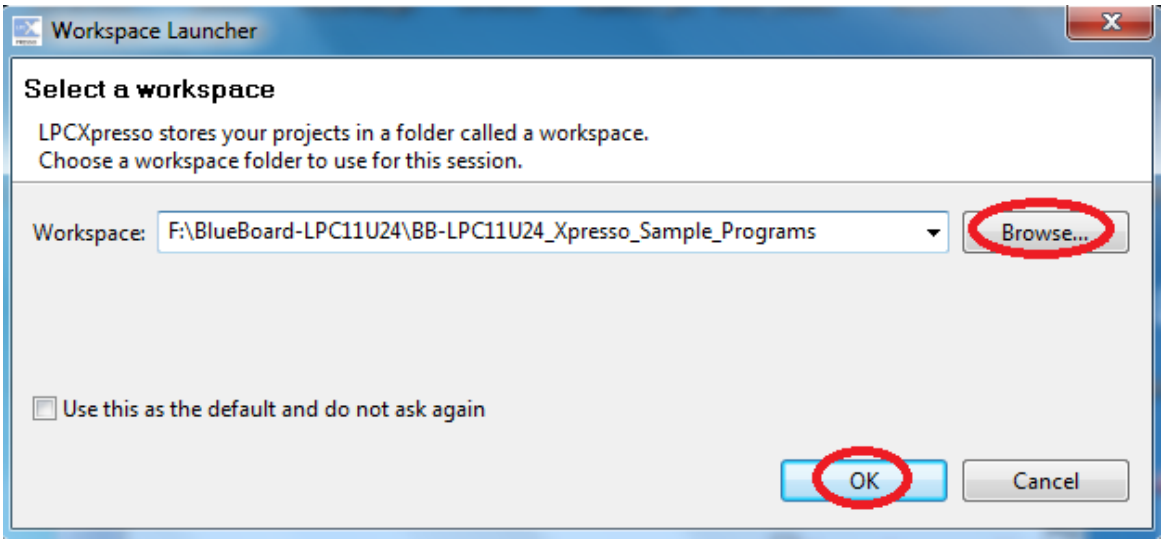

Fig.4

Step 2: Click on Import and Export then Click on Import archived projects (zip).

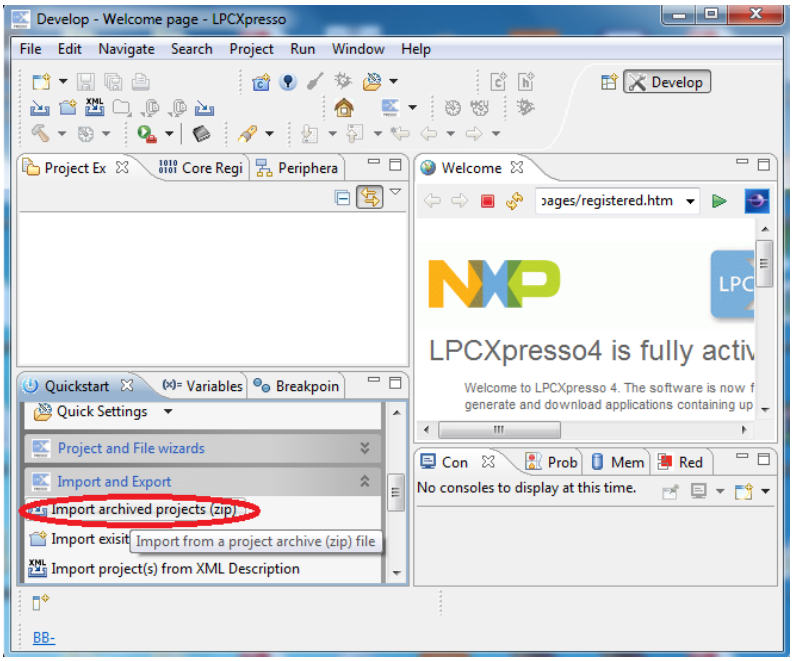

Fig.5

Step 3: Click on Browse to select a archived project (zip) and Click on Open

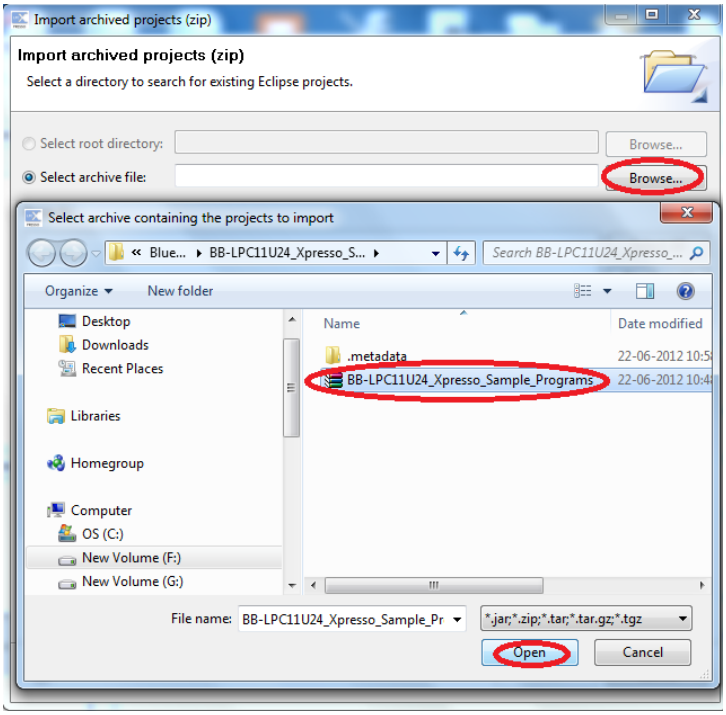

Fig.6

Step 4: Click Finish.

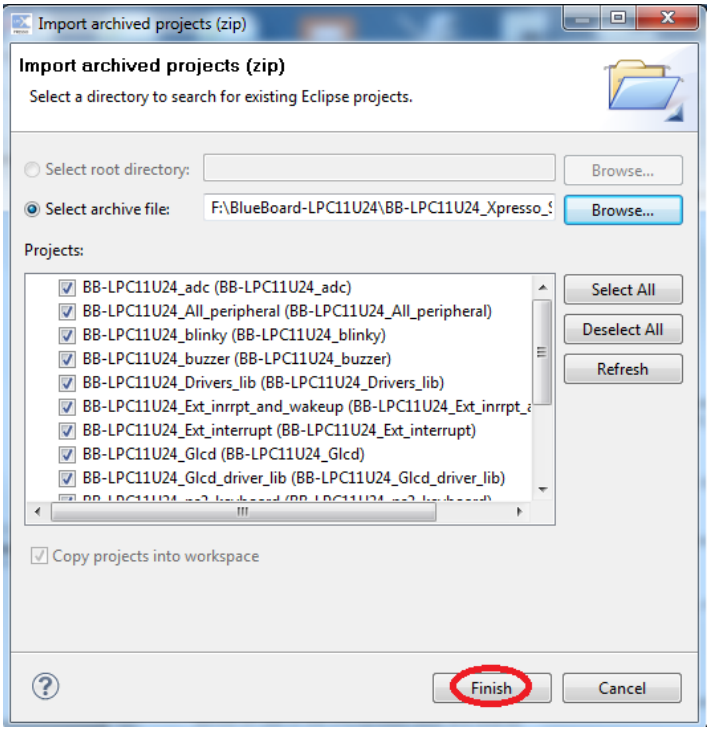

Fig.7

Step 5: First build the BB-LPC11U24_Driver_lib and BB-LPC11U24_Glcd_Driver_lib. To build project Right click on project then click on build Project. For example “BB-LPC11U24_Blinky” as shown in the below image.

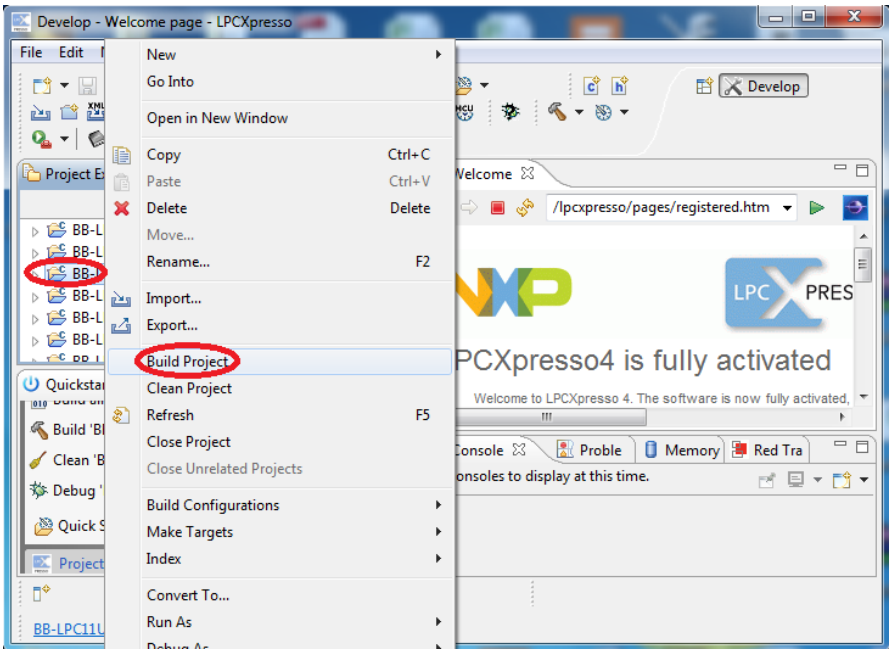

Fig.8

Step 6: After building project click on Debug.

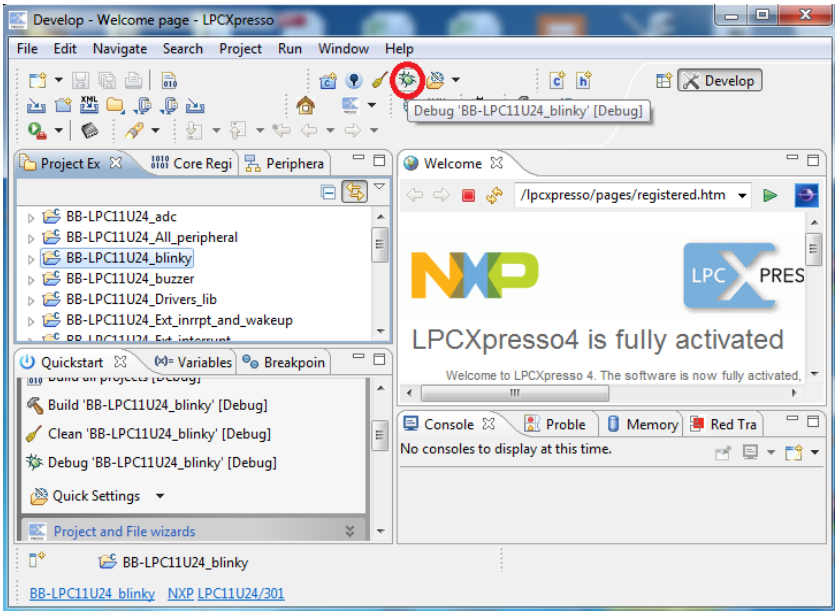

Fig.9

If you get an error as shown in the below image

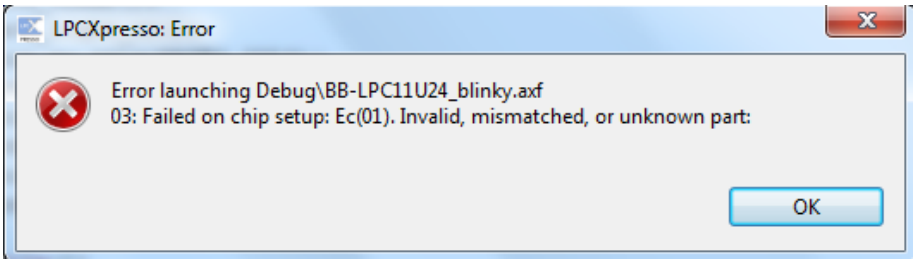
LPCXpresso: Error
Error launching Debug\BB-LPC11U24_blinky.axf
03: Failed on chip setup: Ec(01). Invalid, mismatched, or unknown part:
OK

Fig.10

Check the MCU on the board for part number. Right click on project go to properties as shown in the below image.

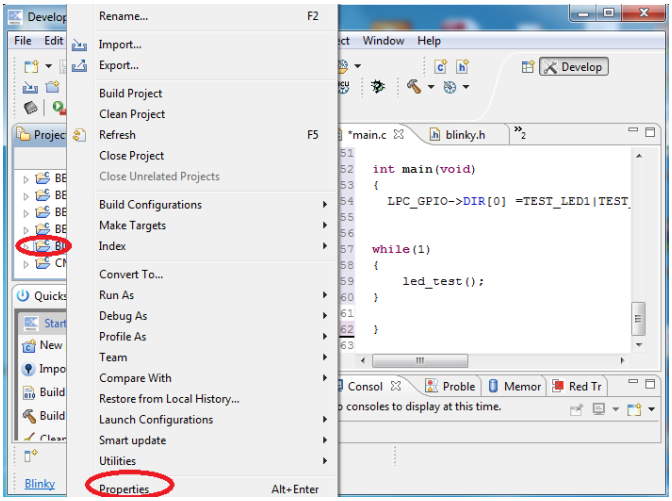

Fig.11

Select the MCU as same as the part number on the board as shown in the below image. If the part number is LPC11U24/301, select LPC11U24/301.

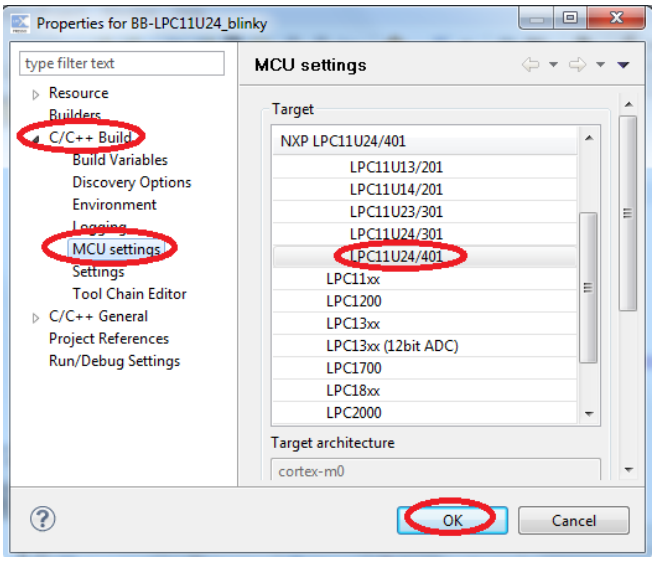

Fig.12

Step 7: Click on Run and select Resume (F8) to start debugging the project. Here the two LED's (D3 and D4) start blinking.

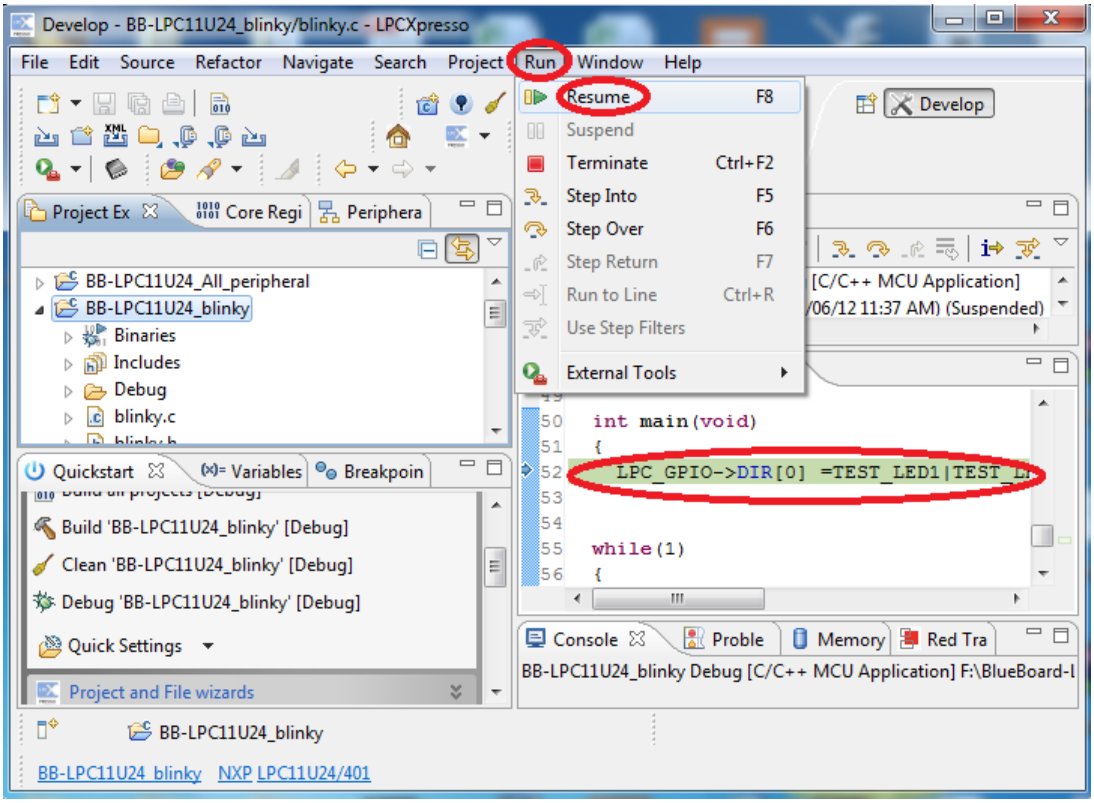

Fig.13

3.2 Creating the sample Blinky project in LPCXpresso

Step 1: Open an LPCXpresso v4.2.2_275 IDE.

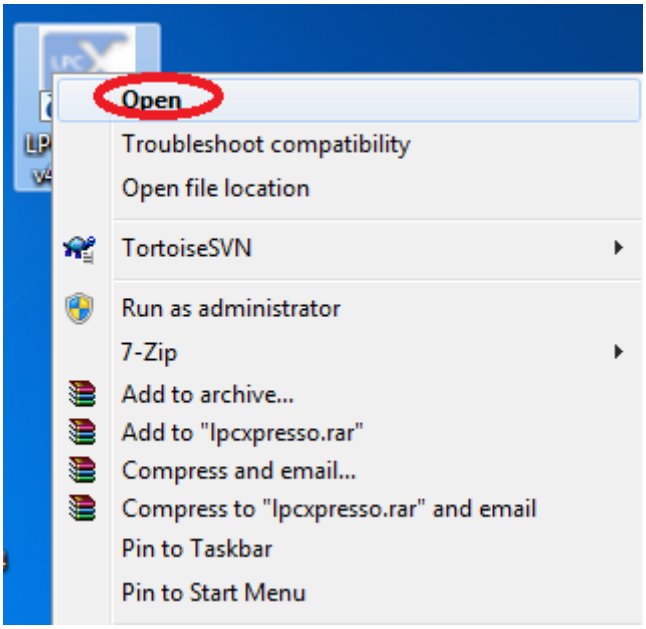

Fig.14

Step 2: Click Browse.. as show below.

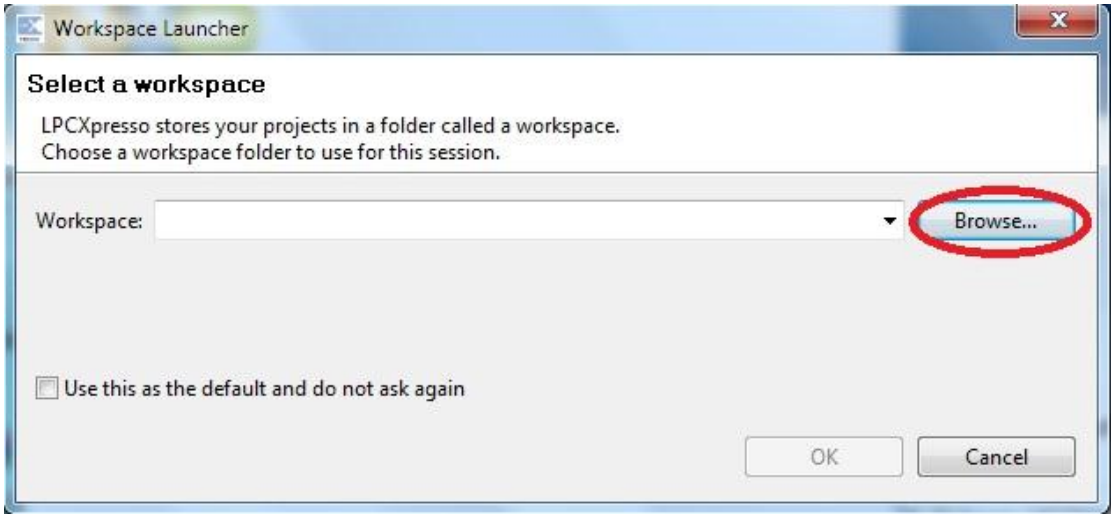
Workspace Launcher
Select a workspace
LPCXpresso stores your projects in a folder called a workspace.
Choose a workspace folder to use for this session.
Workspace:
Browse...
Use this as the default and do not ask again
OK
Cancel

Fig.15

Step 3: Please select BB-LPC11U24_Xpresso_Sample_programs (For BB-LPC11U37: BB-LPC11U37_Xpresso_Sample_programs) folder which downloaded from website, click OK as shown in below image.

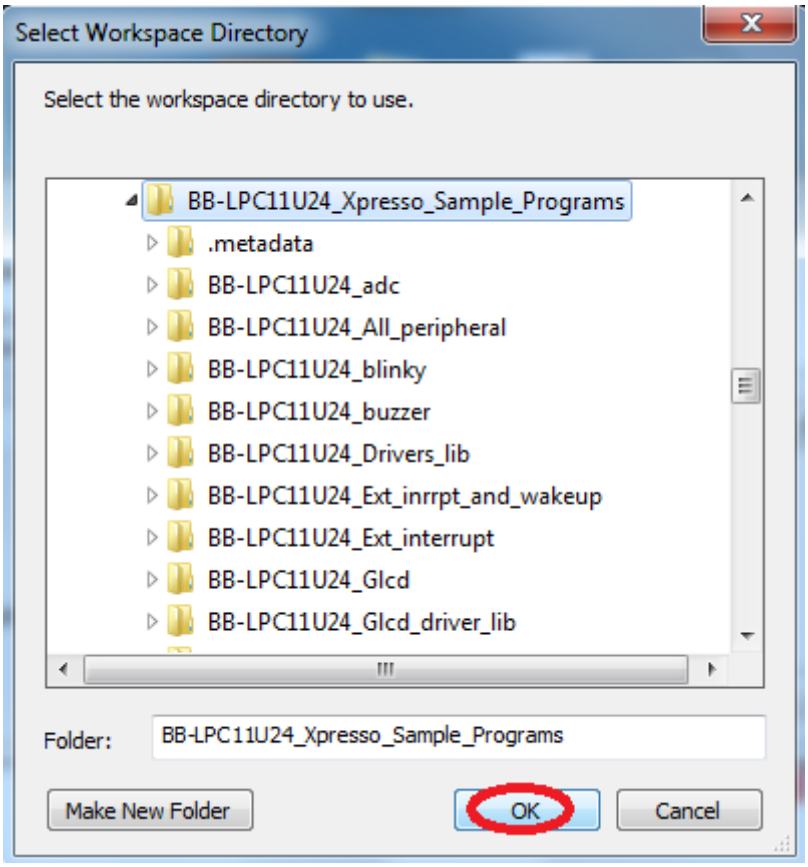

Fig.16

Step 4: Click OK.

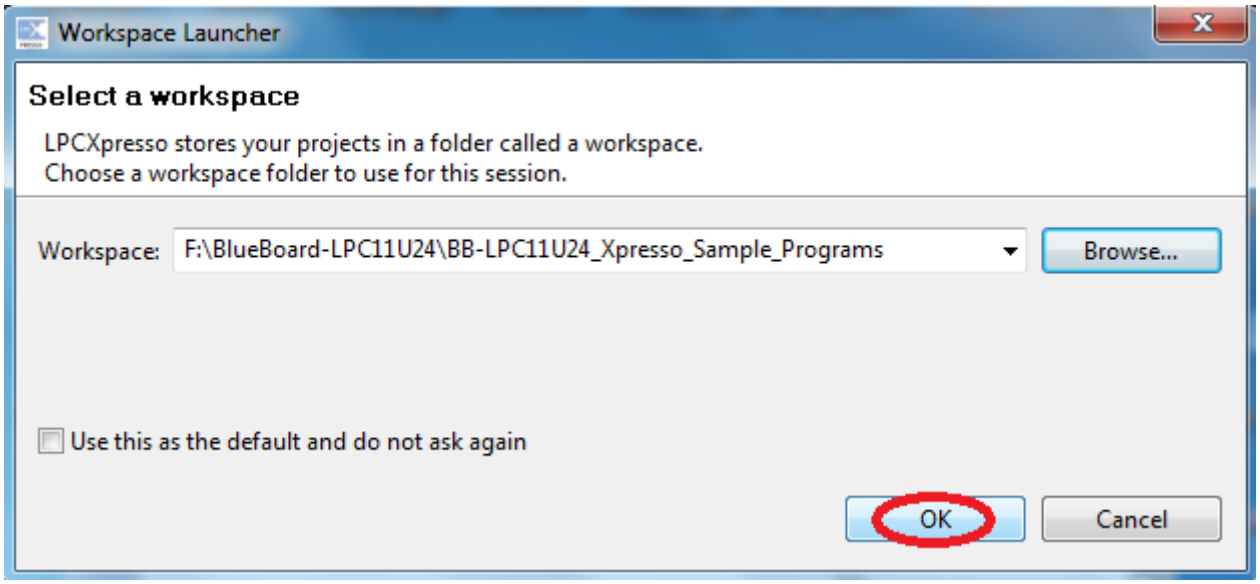

Fig.17

Step 5: Click on File -> New -> Project… as shown below image.

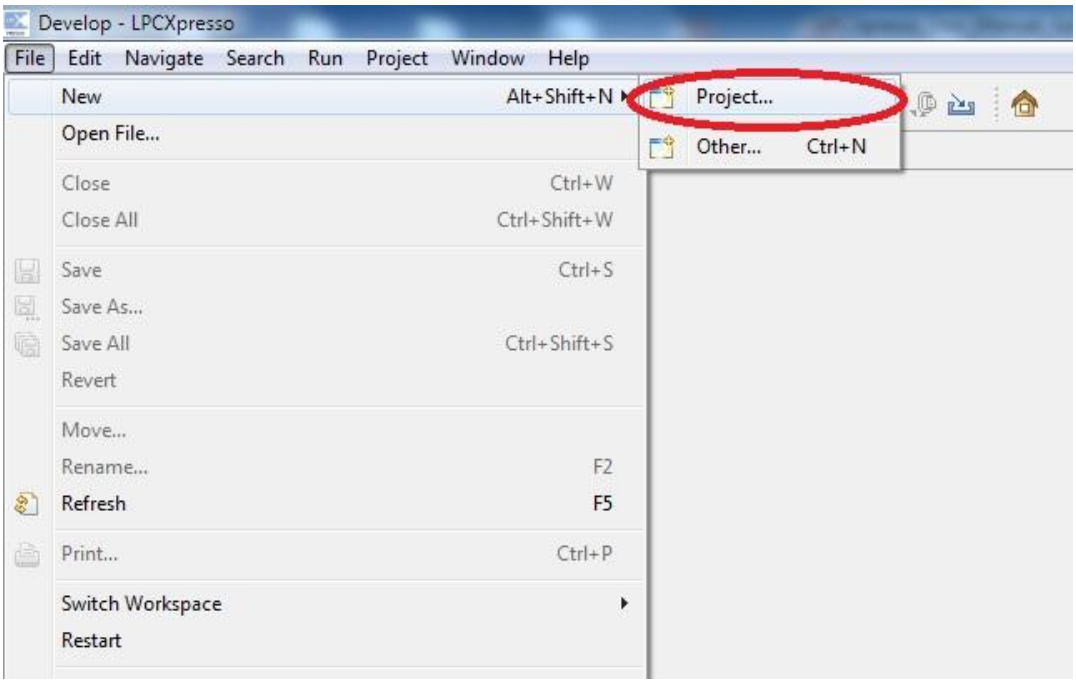

Fig.18

Step 6: Select LPCXpresso C Project and Click Next as shown below image.

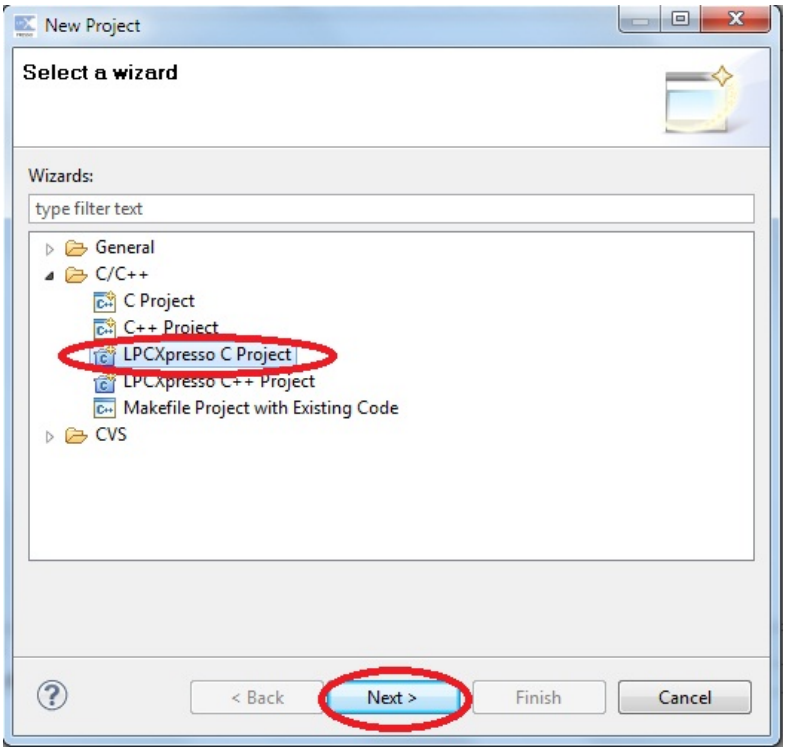

Fig.19

Step 7: Select NXP LPC11U00 projects -> C Project and click Next as shown below image.

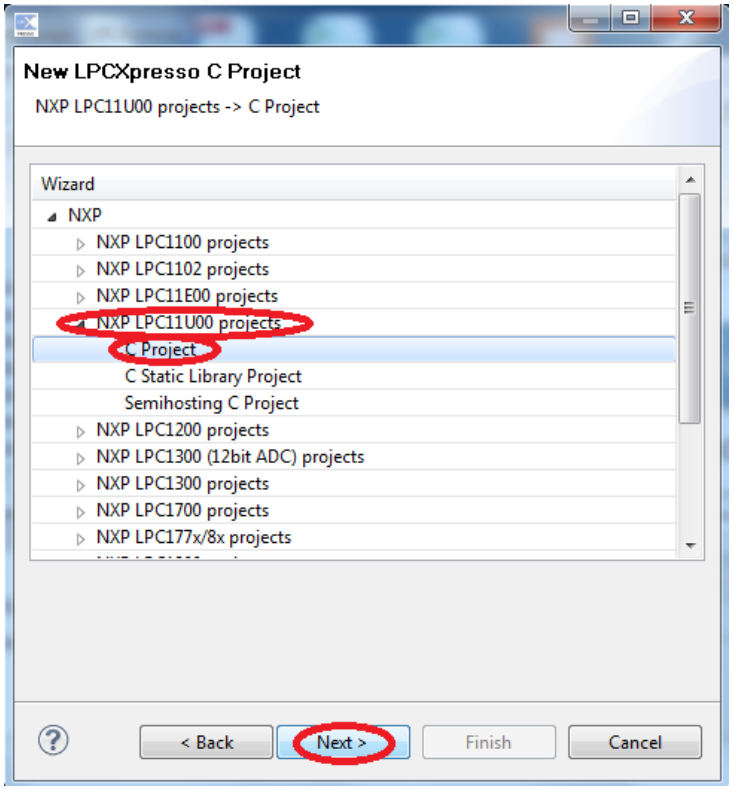

Fig.20

Step 8: Give Project name is Blinky and Click Next.

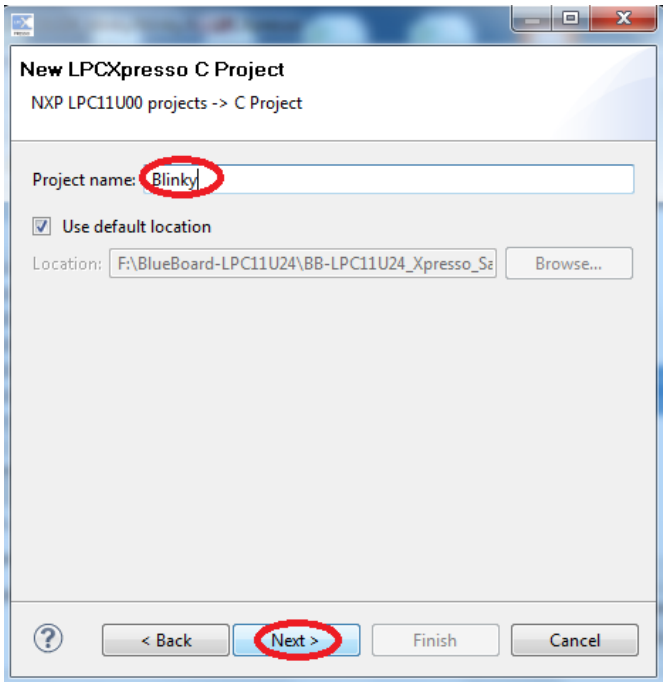

Fig.21

Step 9: Select the target MCU is LPC11U24/401 and click Next as shown in below image.

Note: Check the MCU on the board for part number; if the part number is LPC11U24/301 select LPC11U24/301.

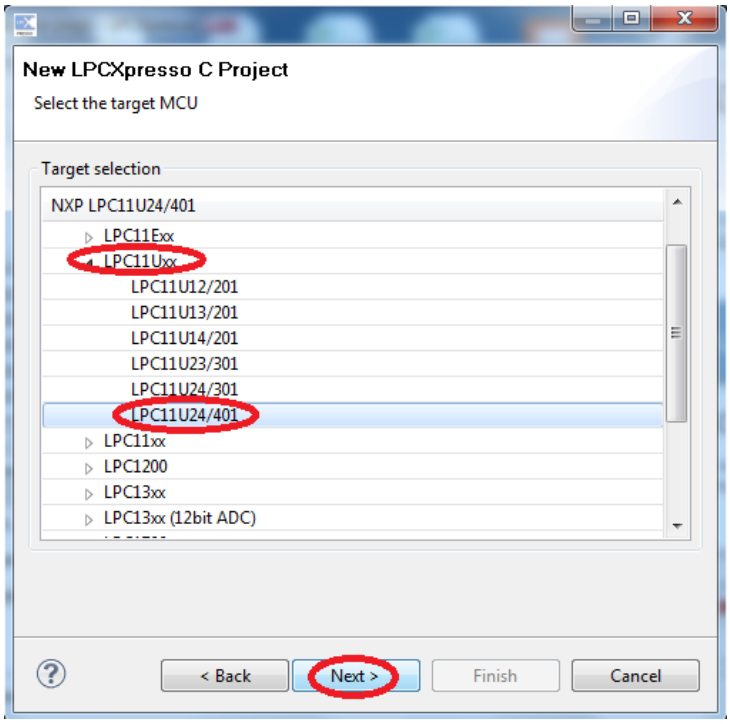

Fig.22

Step 10: Click Finish.

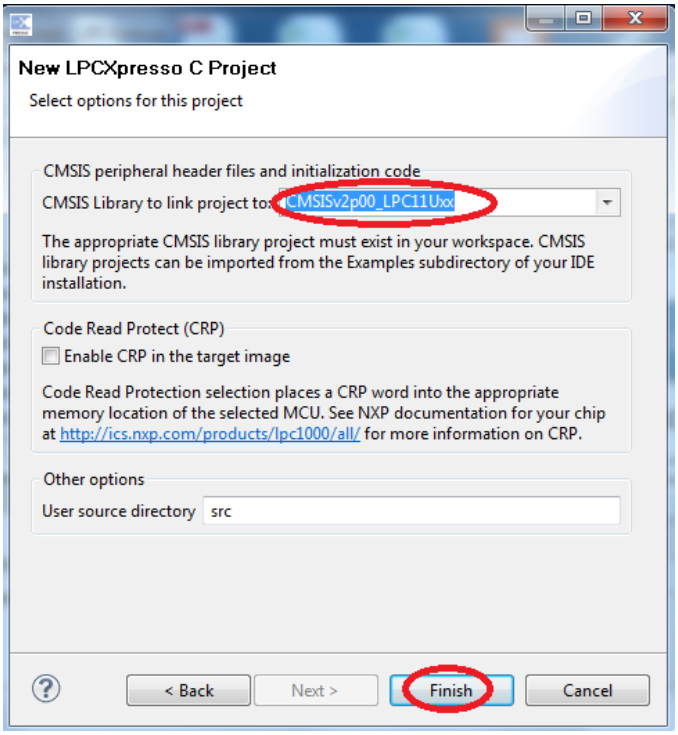
New LPCXpresso C Project
Select options for this project
CMSIS peripheral header files and initialization code
CMSIS Library to link project to:
CMSISv2p00_LPC11Uxx
The appropriate CMSIS library project must exist in your workspace. CMSIS library projects can be imported from the Examples subdirectory of your IDE installation.
Code Read Protect (CRP)
Enable CRP in the target image
Code Read Protection selection places a CRP word into the appropriate memory location of the selected MCU. See NXP documentation for your chip at http://ics.nxp.com/products/lpc1000/all/ for more information on CRP.
Other options
User source directory
src
< Back
Next >
Finish
Cancel

Fig.23

Step 11: The New Blinky Project is created, double click on main.c file as shown below image.

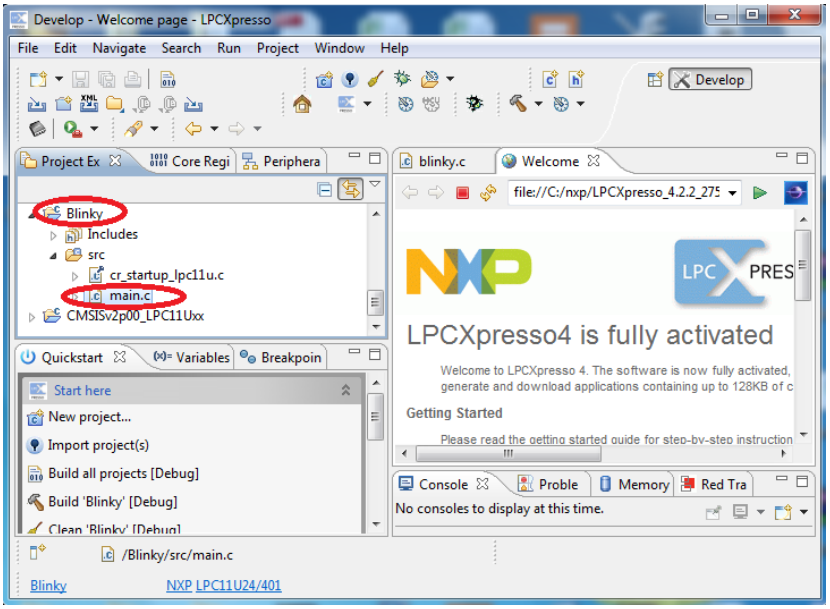

Fig.24

Step 12: After double click the main.c file will open in LPCXpresso as shown in below image

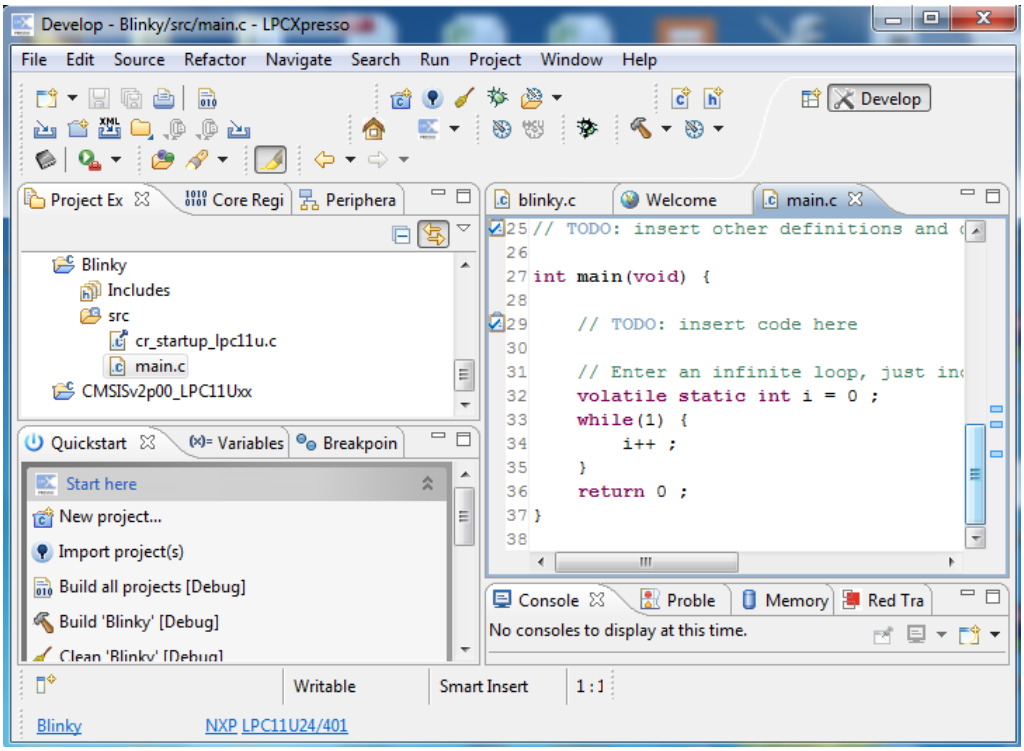

Fig.25

Step 13: Write a C program for LED blinky, after the program Click on Save as shown in below image.
(Note: Writing a C code for Blinky project Please refer Downloaded BB-LPC11U24_blinky example)

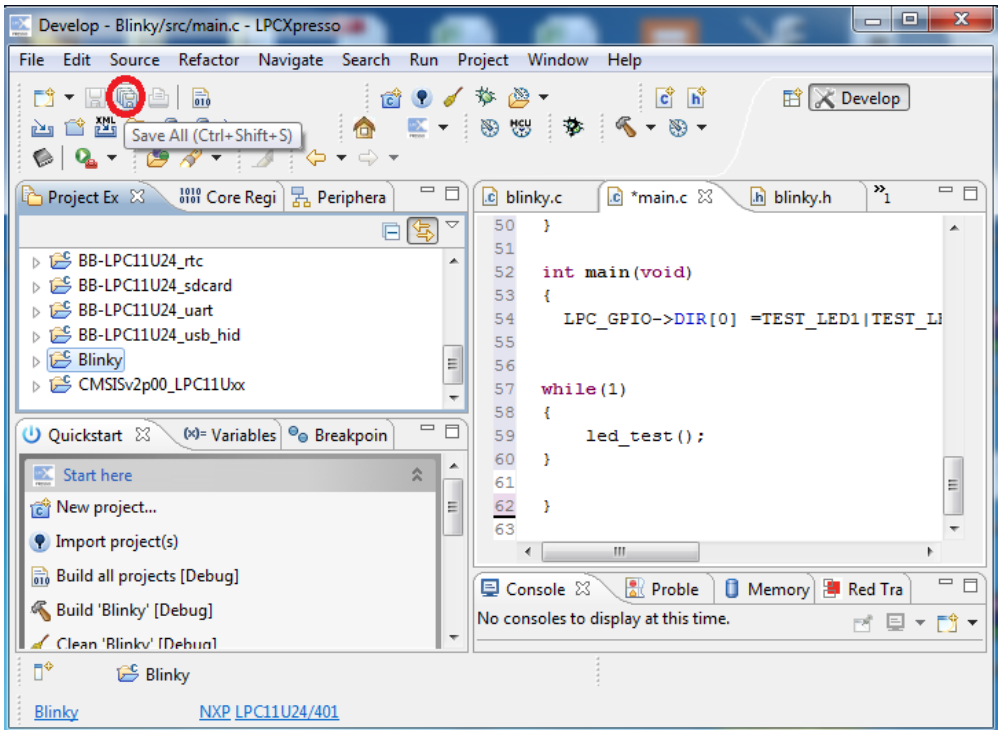

Fig.26

Step 14: To include .h files from BB-LPC11U24_Driver_lib in your project right click on your Project and click on Properties.

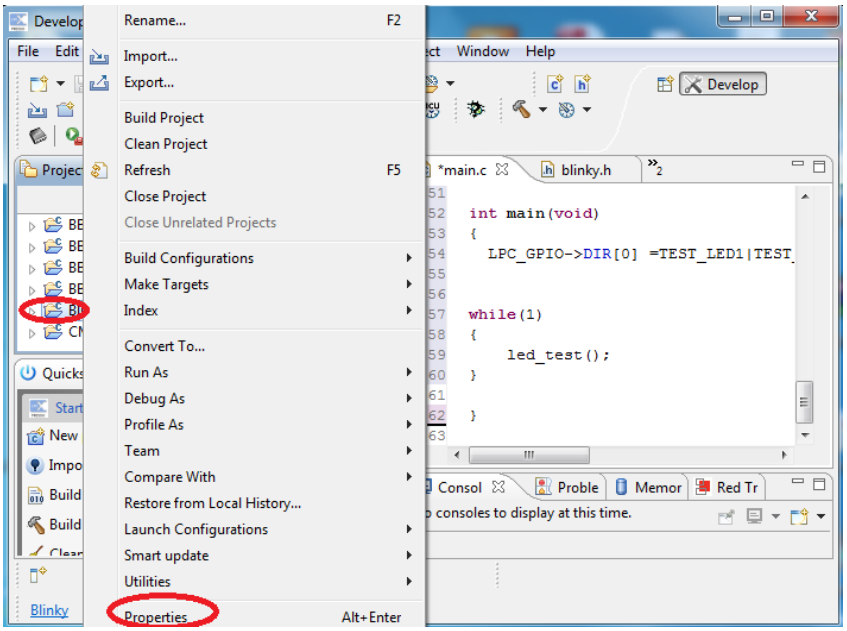

Fig.27

Step 15: Select C/C++ Build ->Settings then Includes, click on Add then click on workspace to select the .h files path as shown below image.

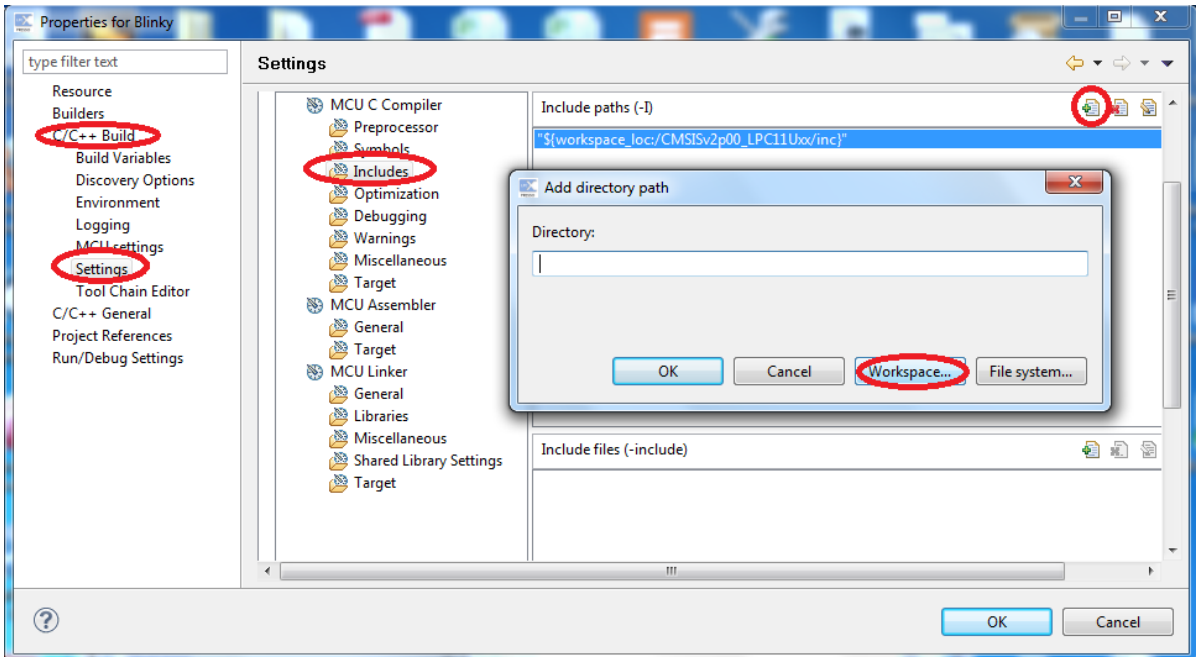

Fig.28

Step 16: Select .h files path then click OK as shown below image.

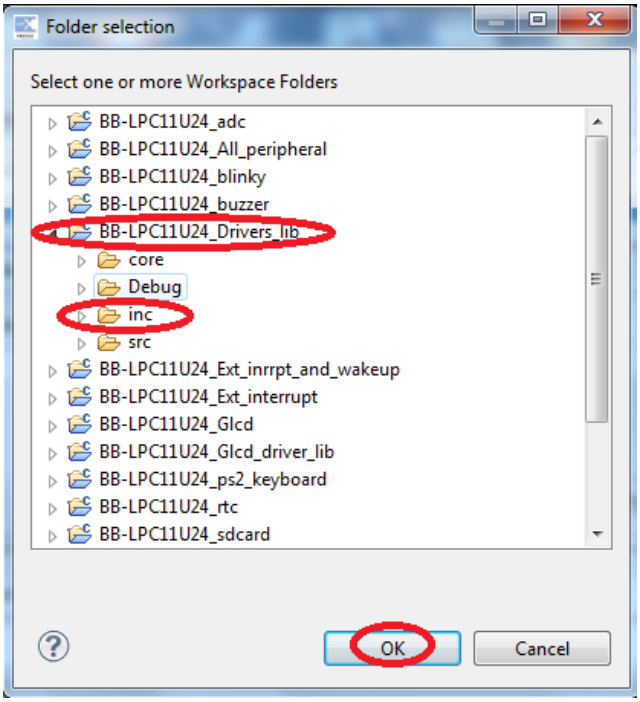

Fig.29

Step 17: Click OK and OK as shown below image.

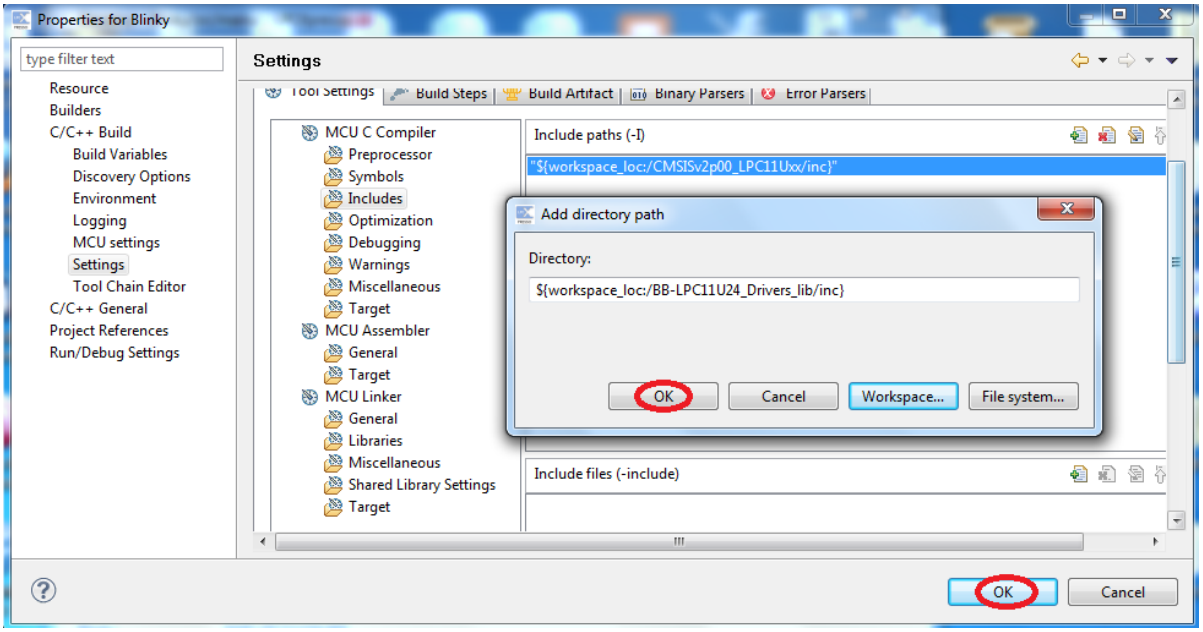

Fig.30

Step 18: To include BB-LPC11U24_Driver_lib in blinky project right click on Blinky Project and click on Properties.

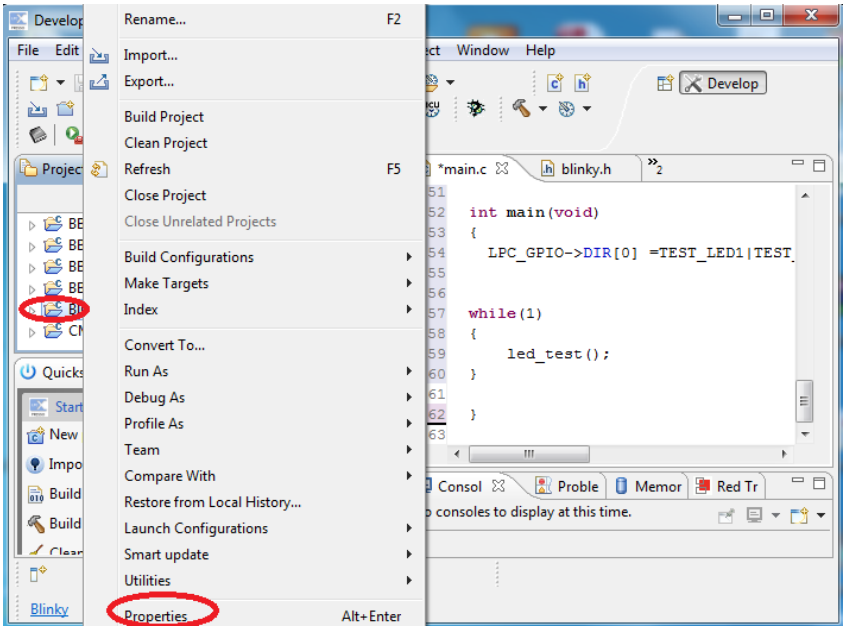

Fig.31

Step 19: Select C/C++ Build ->Settings then Libraries, click on Add, enter the library name then click OK as shown below image.

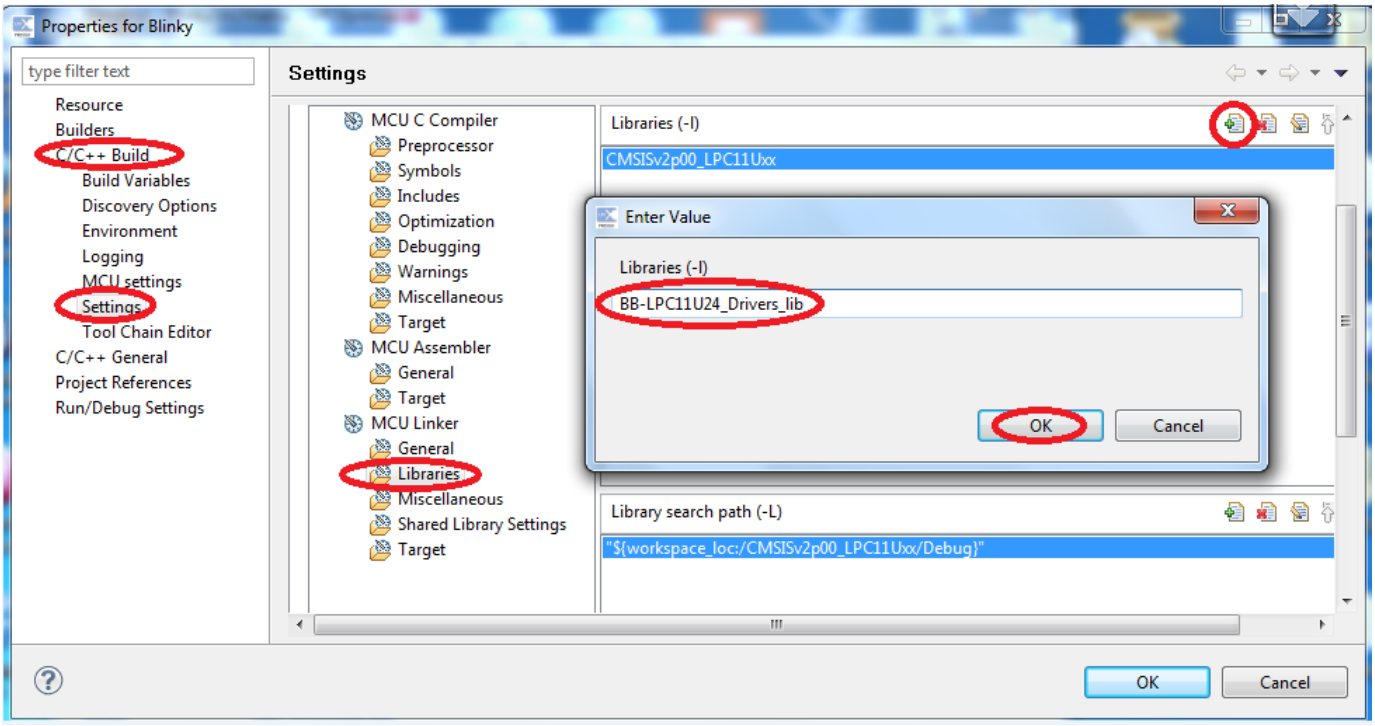

Fig.32

Step 20: Click on Add then click on Workspace as shown below image.

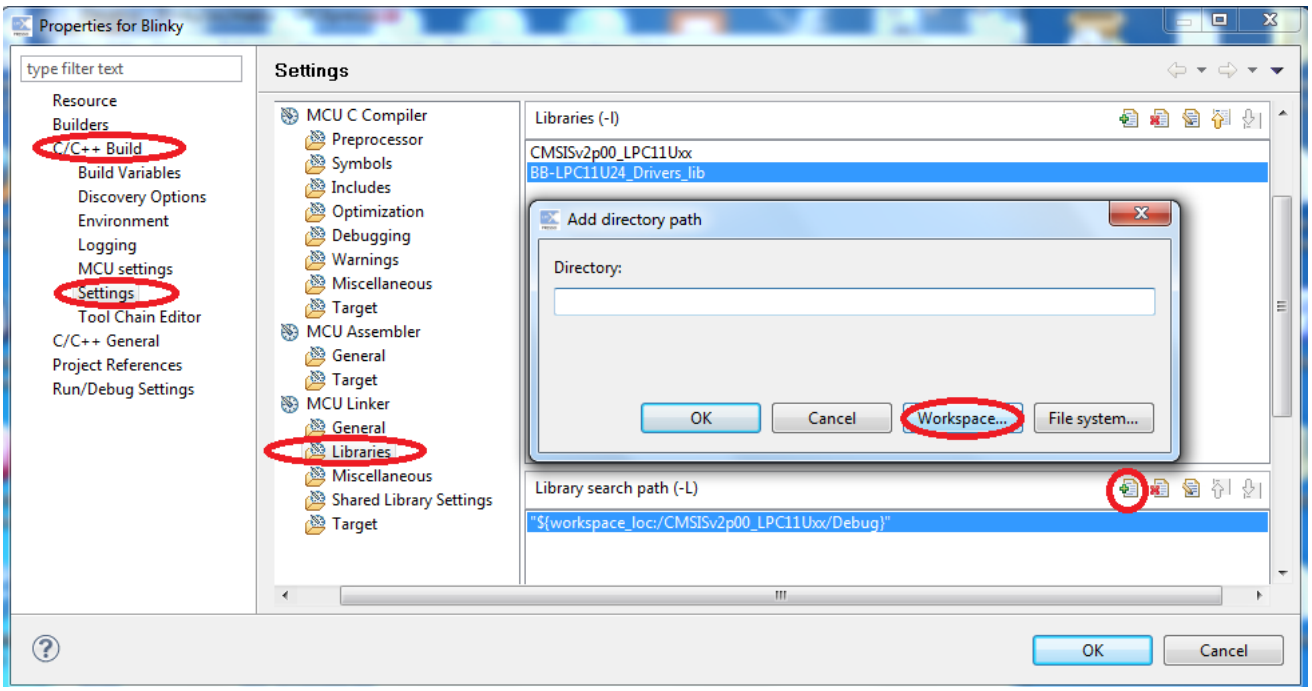

Fig.33

Step 21: Brows the library path then click OK as shown below image.

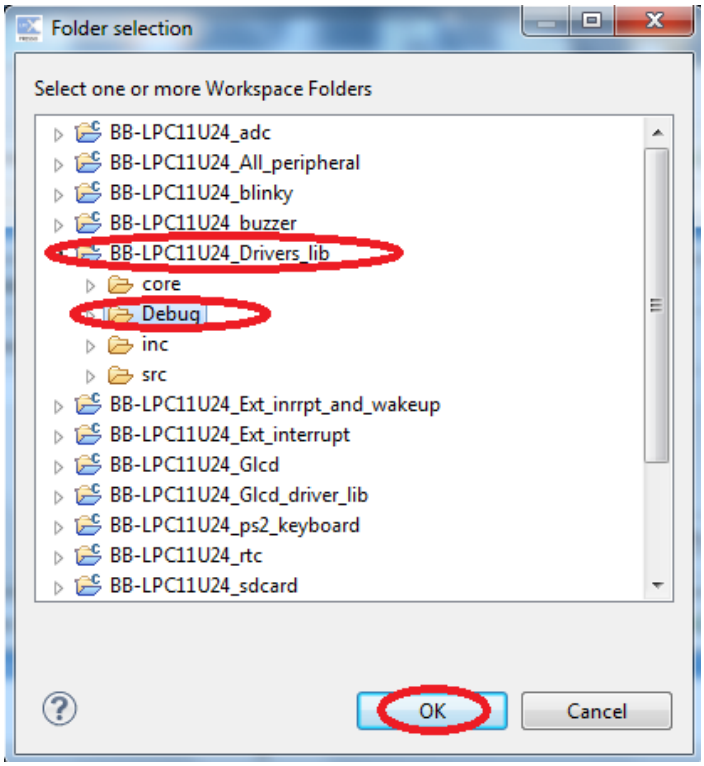

Fig.34

Step 22: Click OK and OK as shown below image.

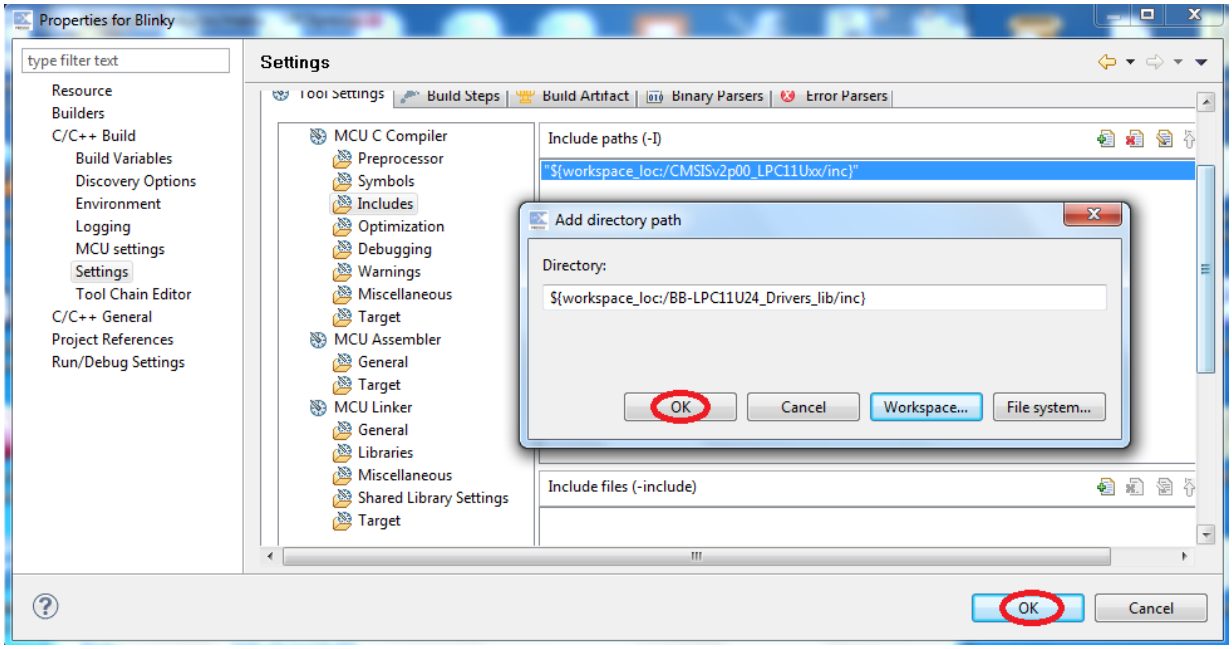

Fig.35

Step 23: Right Click on Blinky Project and click on Build Project, build must be error free.

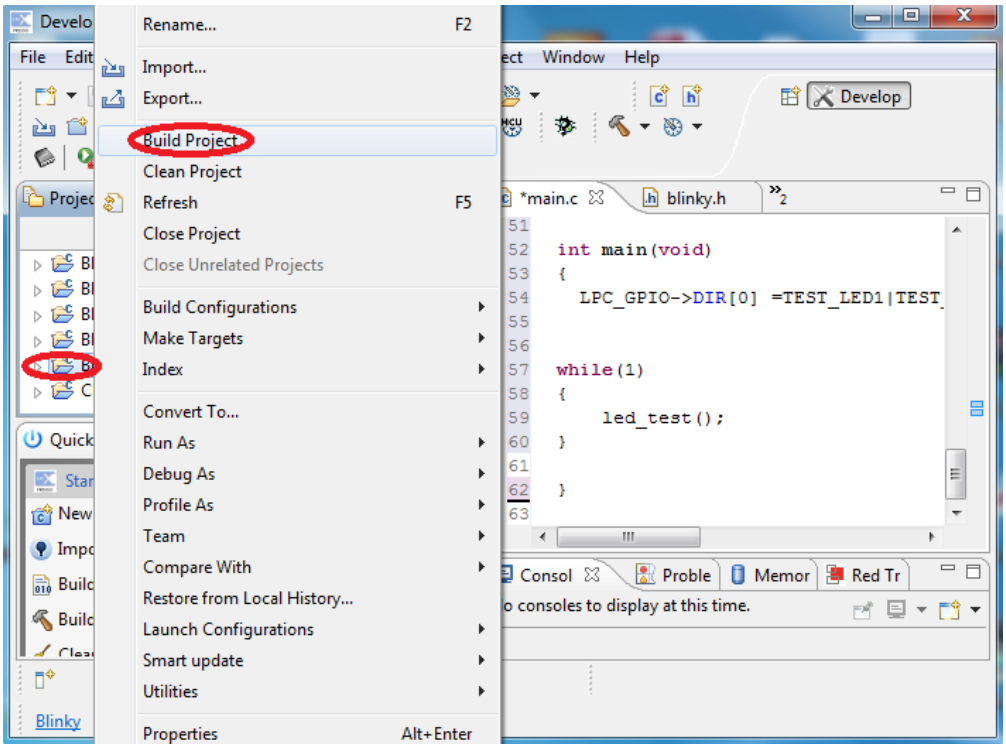

Fig.36

Step 24: After successful build, click on Debug as shown in below image

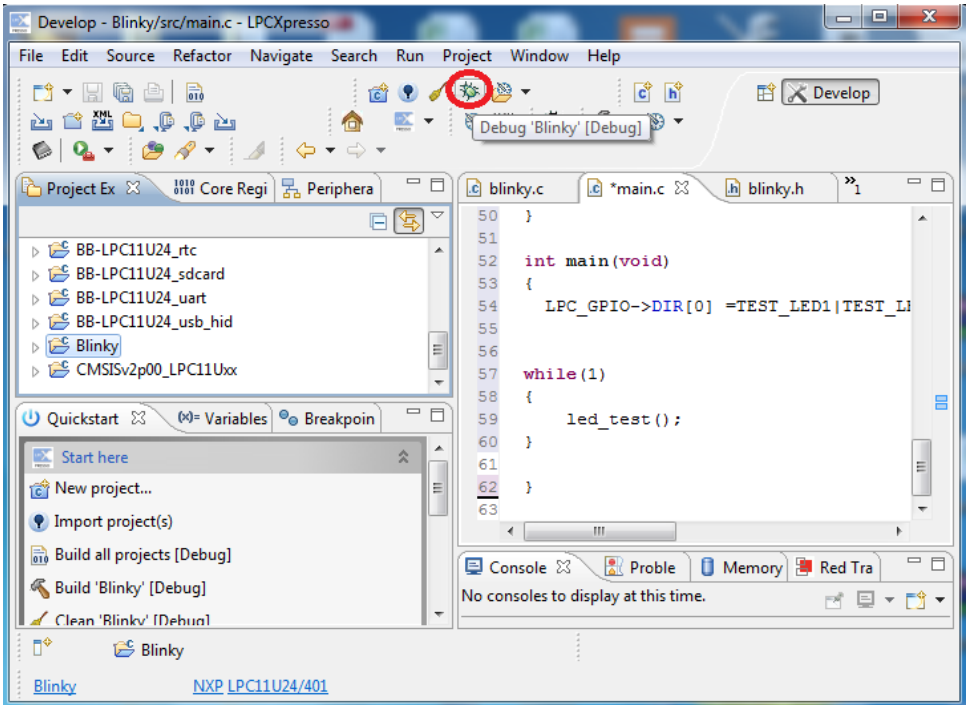

Fig.37

Step 25: Click Resume for free running, the LED D3 and D4 are starts blinking on BB-LPC11U24/37.

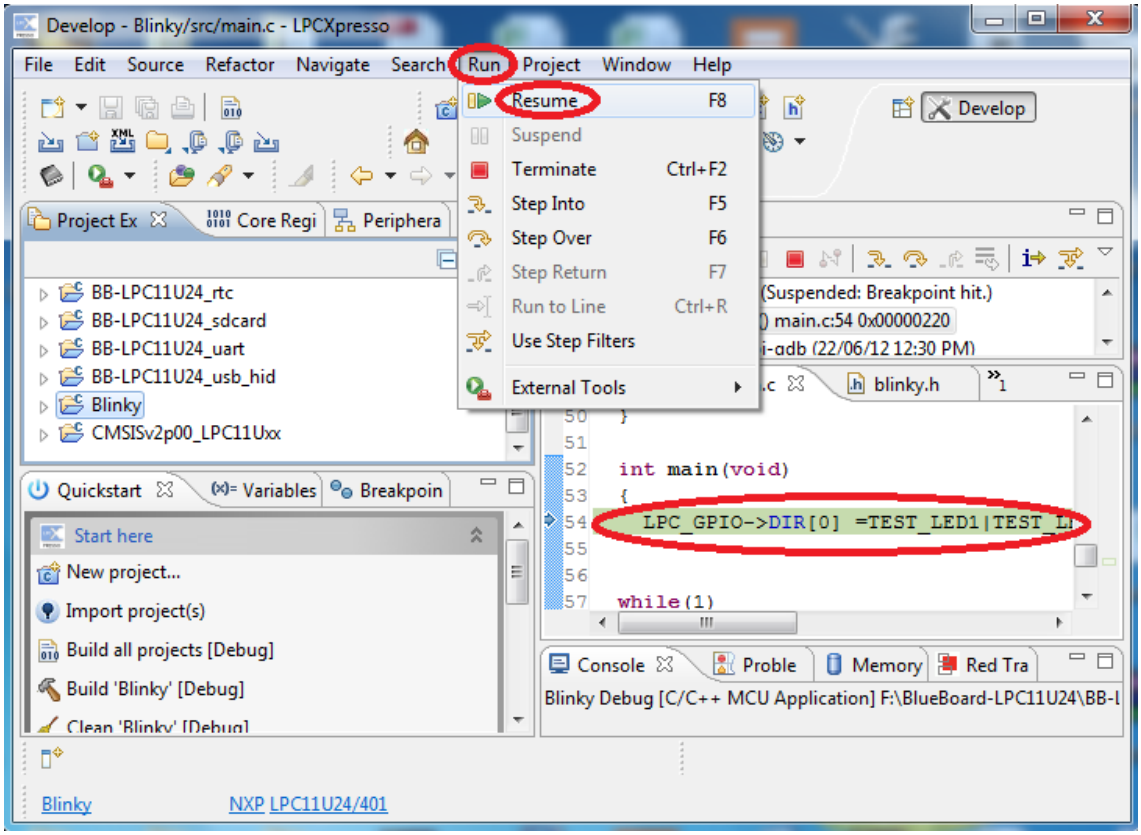

Fig.38

4.0 BLUEBOARD-LPC11U24/37 Programming

4.1 Programming options

BLUEBOARD-LPC11U24/37 can be programmed using the

- On-chip bootloader (USB or UART)
- Debugger (NXP LPC-Link)

4.1.1 On-Chip bootloader (USB or UART)

In order to program the board either through USB or UART we need to get the board under programming mode.

Getting the board in programming mode:

Theory: The On-chip bootloader looks for a logic LOW to be present on a pre-defined PIN (ISP pin) during reset. If the ISP pin is held LOW and reset signal is provided to the MCU, the MCU enters into programming mode.

Practical:
On the BLUEBOARD-LPC11U24/37 the RESET and ISP signals are connected to buttons provided on the board. Look for the RESET and ISP marking on the board. Therefore to enter into programming mode:

- **Press and hold** the ISP button
- Press the RESET button and release it
- Now release the ISP button
- The board is in the programming mode

We know that the on-chip bootloader can be used with USB or UART. Please note that if you have connected a USB cable to the board the USB bootloader is activated else the UART bootloader is activated. Meaning, if you have connected the USB cable as your power source then you cannot use UART bootloader, you need to use an alternate external power source (DC jack) to enable UART bootloader. If a particular MCU supports USB bootloading it is highly recommended to use the same for programming.

Programming through USB is the most convenient way to program the BlueBoard-LPC11U24/37. The LPC11U24/37 has an on-chip USB bootloader support which makes programming the board very simple. You don't require any PC application to program using USB bootloader. Once the board enters the programming mode it appears as a drive on your Windows machine and all you need to do is just drag-n-drop your binary to this drive.

Note: Not all NXP USB MCUs support USB boot loading. For example the LPC11U14 does not support USB bootloader although it has support for USB on the chip.

4.1.2 Flashing the board using USB

The pre-build binaries can be used to flashing onto to the board for each peripheral by using the USB bootloader as a Mass storage device. Press SW4, then SW5; release SW5, then SW4, the mass storage device will appear on your screen. On the board LED D1 glows. Remove firmware.bin file and then place your bin file and then press reset switch to execute the specific code written on to the flash.

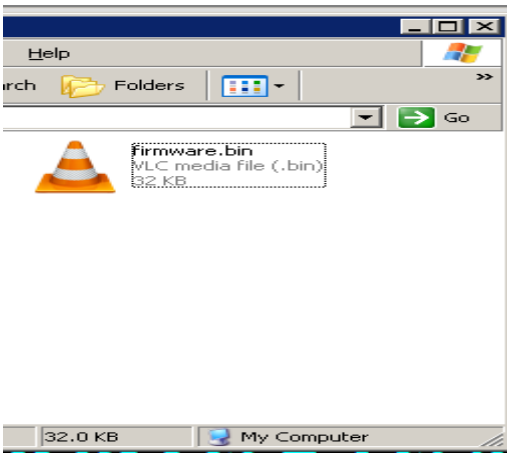

Fig. 39

Flashing the bin file (Drag & drop).

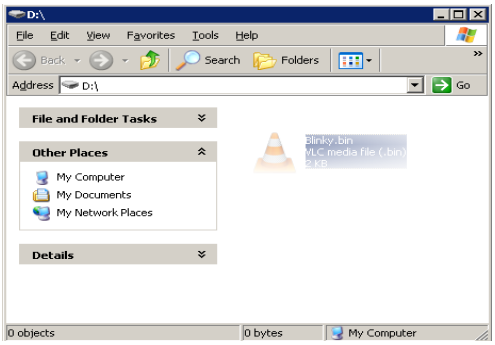

Fig. 40

4.2 Flashing the Hex file through UART

Step 1: Connect the serial cable to the PC as well as to the board UART0 and open the flash magic tool.

Step 2: Input all the parameters as shown in below Fig.

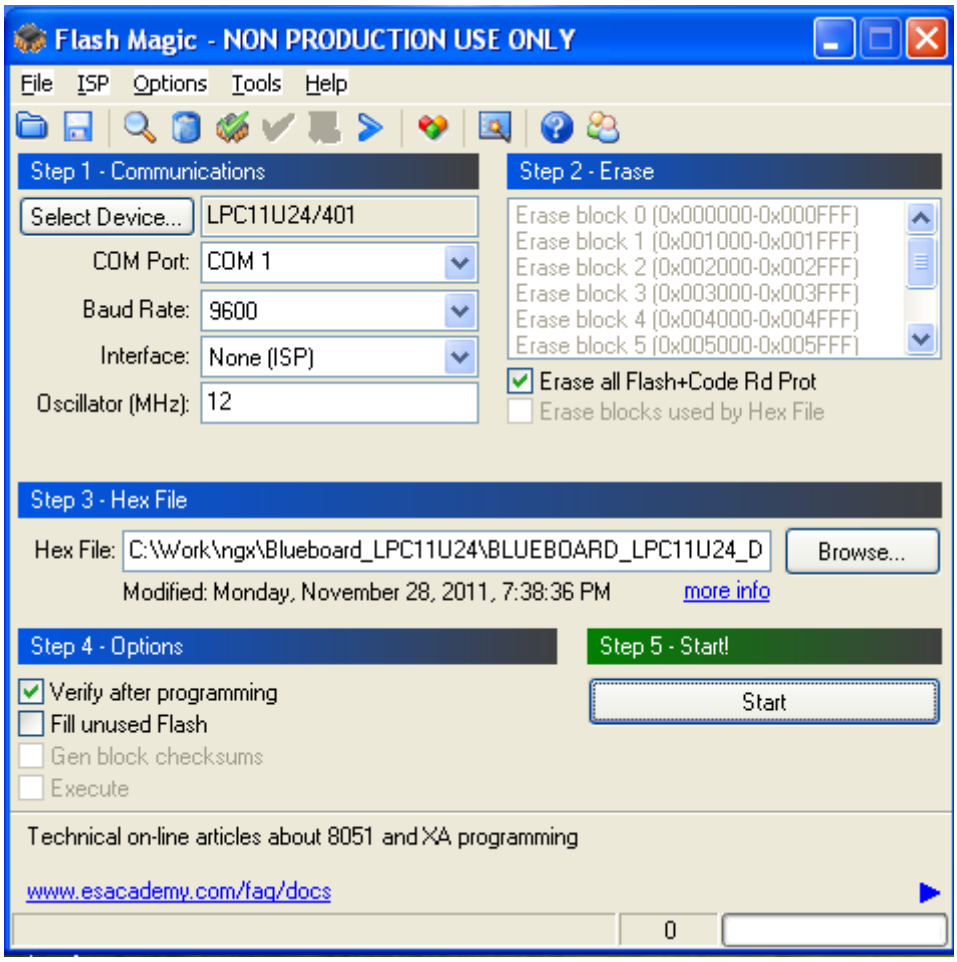

Fig. 41

Note: Check the MCU on the board for part number; if the part number is LPC11U24/301 select Device LPC11U24/301.

Step 3: Click S**tar**t to flash the hex file. Press Reset to run.

NOTE: Make sure that the Board is not powered through USB.

5.0 Schematic & Board Layout

5.1 Schematic

This manual will be periodically updated, but for the latest documentations please check our website for the latest documents. The Board schematic and sample code are available after the product has been registered on our website.

5.2 Board layout

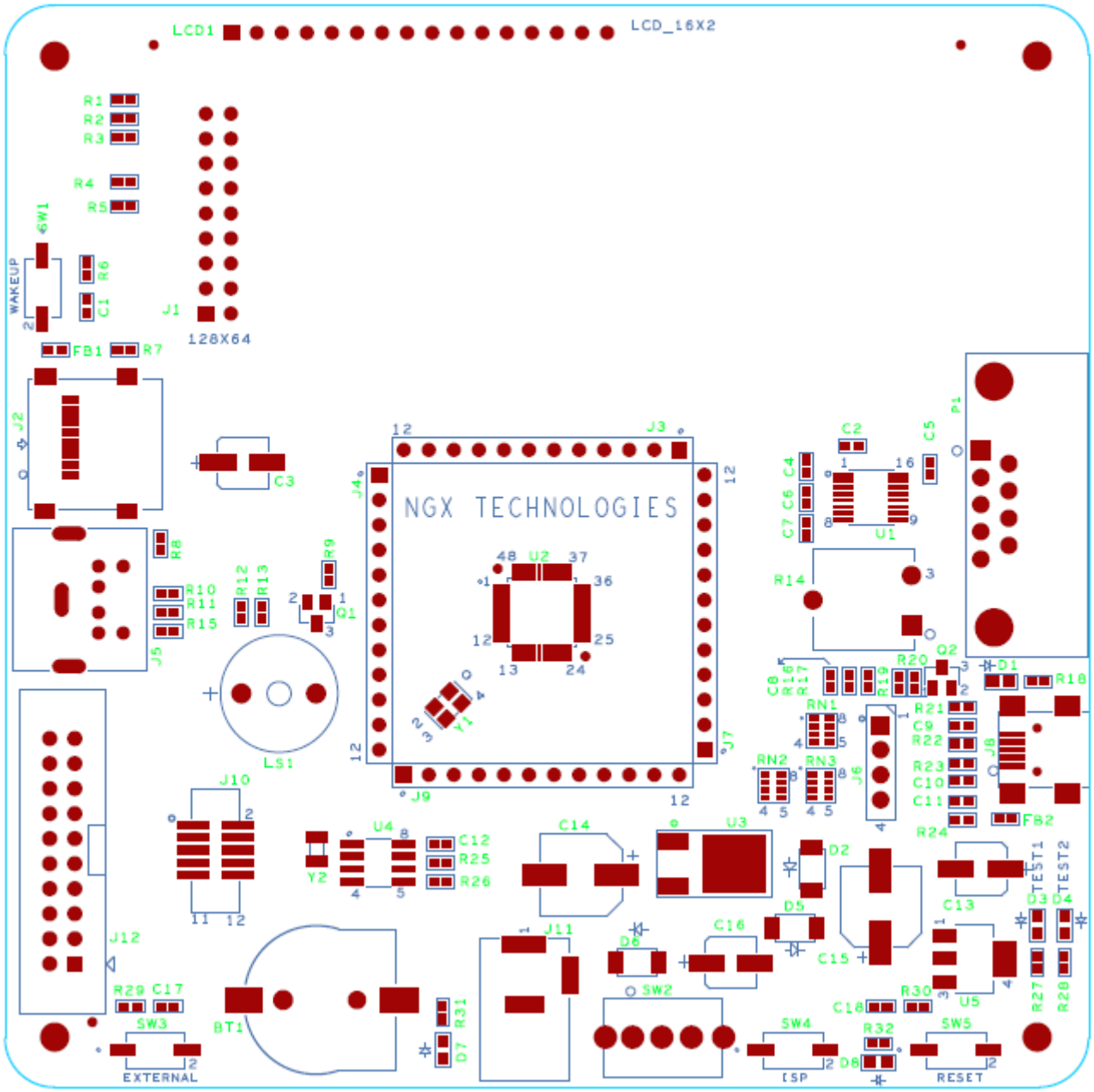

Fig. 42

6.0 CHANGE HISTORY

6.1 Change History

Rev	Changes	Date (dd/mm/yy)	By
1.0	Initial release of the manual	18/06/2012	Veeresh Tumbaragi

7.0 REFERENCES

In addition to this document, the following references are included on the NGX BLUEBOARD-LPC11U24/37product and can also be downloaded from www.ngxtechnologies.com:

- NGX BLUEBOARD-LPC11U24/37 schematic for the Development board.

Additional references include:

- Information on development tool being used:
  - LPCXpresso, http://lpcxpresso.code-red-tech.com/LPCXpresso/
  - Flash magic, http://www.flashmagictool.com/

About this document:

Revision History

Version: V1.0 author: Veeresh Tumbaragi

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